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Rubber Research Scheme

(CEYLON.)

Second Quarterly Circular

FOR

1926.



Peradeniya, July, 1926.

GENTLEMEN,

Herewith the Second Quarterly Circular for 1926, dealing with the following subjects:—

“The Budding of Rubber—The present position.”

*By F. A. Stockdale, C.B.E., M.A., F.L.S.,
Director of Agriculture, and
Chairman, Rubber Research Scheme.*

“The Budding of Rubber on a commercial scale.”

By R. A. Taylor, Physiological Botanist.

“Notes on Spraying of Rubber in Ceylon.”

“Report on visit to South India.”

By R. H. Stoughton-Harris, Mycologist.

J. MITCHELL,

Organising Secretary.

RUBBER RESEARCH SCHEME (CEYLON),
Peradeniya, 30th June, 1926.

THE BUDDING OF RUBBER.

The Present Position.

F. A. STOCKDALE, C.B.E., M.A., F.L.S.,

Director of Agriculture, Chairman, Ex. Co., Rubber Research Scheme,

In the *Tropical Agriculturist* for December, 1921, and subsequent numbers attention was drawn to the possibilities of budding or bud-grafting rubber. Various demonstrations in budding methods were subsequently given. It was pointed out that investigations in different rubber-growing countries had demonstrated the widely differing yielding capacities of plantation rubber trees. Observations made in Sumatra and in Ceylon have shown that yield is most probably an inherent character, as good yielders remain, if disease factors do not interfere, as good yielders and bad yielders remain bad yielders. This appears to be established under differing soil conditions and though it is possible for yields to be increased by different cultural operations it is improbable that a bad yielder can be transformed into a good yielder.

With these facts established, it therefore became apparent that increased yields from rubber plantations could be looked for if propagation from only high-yielding stock was adopted and two methods were available, viz., by seed selection and by budding.

The results which can be attained by seed selection are seen in the figures which have been published from the individual tapping experiment on the Peradeniya Experiment Station from the plantation raised from Heneratgoda No. 2 tree. Whereas the average yields from this plot are in excess of yields from trees of mixed parentage, they show that areas planted from seed, the maternal parent of which is known to be a high yielder, will always contain a mixture of high, moderate and low yielders. Difficulties in controlling cross-pollination and the knowledge that seedlings from a known-parent gave varying results naturally suggested that budding would provide a more certain, and at the same time a quicker means of securing plantations of high-yielding capacity.

When budding first attracted public attention extraordinary hopes were entertained by some as to the possibilities of very high acreage yields and the enthusiasm aroused

received a severe set back when the first yields from budded areas in the Dutch East Indies became available. These results did not justify the extravagant expectations of the budding enthusiasts and showed that much more experimental work was required. They came to hand when the rubber industry was in the depths of the slump and these disappointments were interpreted by many as failures. Interest in budding waned and it was only a few who persisted in their efforts.

With the recovery of the industry and the decision to plant up further new areas, interest in budding has again been aroused and a large number of growers are now desirous of undertaking the budding of considerable areas. The latest reports from budded areas in Malaya and the Dutch East Indies indicate that very high yields are being secured from budded areas and in consequence it is essential for every grower desirous of securing the highest yield from newly planted lands to undertake budding. The future of plantation rubber in the form of large estates depends upon the production of high acreage yields. There is little doubt that the production of rubber by small growers will eventually play a much more important part in the rubber industry than it does at present and will constitute in the long run a factor of enormous importance. The production of rubber by small growers has during the past few years increased enormously and although this output in many rubber growing countries reacts with the price of the commodity there is no doubt that the industry will in the future secure from small growers those supplies which will keep prices on a reasonable basis. All estates therefore desirous of being prepared for the time when production will be equal to or even in excess of demand must look to either cheaper production or increased production per acre. The former may be attainable in certain cases, but is unlikely to be generally possible, and therefore those who desire to look to the future would be advised to explore the possibilities of higher acreage yields.

Budding offers these possibilities provided that certain necessary and essential preliminaries are given heed to. It is, therefore, proposed to review the results that have been secured up to date and to summarize the conclusions that are to be drawn therefrom. Production figures from large acreages of buddings have not been published but they are reported to have been in many cases 50 per cent. in excess of fields from seedlings.

It has been demonstrated that high yielders do not invariably give rise to high yielding offspring. Some high yielding mother trees do not produce uniformly high yielding progeny. The value of a mother tree for budding purposes can only be determined by actual tapping of the offspring. All the budded offspring of a single mother tree are referred to collectively as a "clone" and the feature which has been shown by tappings of budded areas is the uniformity of the yields of the individual members of any one clone. All are either high yielders, moderate yielders or poor yielders. It also appears that there are high yielding trees which give rise, under varying conditions, to clones of offspring which are uniformly high yielding.

A small number of results from the Central Experiment Station at Java indicate that there may be some influence between stock and scion. The figures available are limited and therefore the conclusions drawn from them can only be tentative. They do however indicate that the growth of the root stock is related to the vigour of the scion used and that the yield values of the stock and scion show some relation to one another. These indicate that care must be taken in the choice of stocks and that budding should be done on stocks of good quality grown from seed of selected trees. It is quite possible that certain combinations of stocks and scions will give better results than others and therefore it is essential that some knowledge of the origin of the stock on which buddings are done should be available.

Tappings of budded trees have shown that yields do not increase as the cut approaches ground level as is the case with seedlings and there are indications that bark can be productively tapped at greater heights than with seedlings.

Budded trees appear to be cylindrical in shape and in this respect differ from seedlings.

YIELDS.

The following summary of yields which have been published up to date may be of general interest.

MALAYA.

(a) Age.— Of stock 5 years, of bud shoot 4 years.

- (b) **Girth.**—21.66 inches at 17 inches from ground and only 1.17 inches less at 39.37 inches from ground.
- (c) **Mother trees.**—13 years old.
- (d) **Stocks.**—Miscellaneous—not selected seed.
- (e) **Control trees** from same stock non-budded.
- (f) **Tapping System.**—Half spiral, daily tapping for 5½ weeks followed by rest for same period, then change to alternate day tapping.

- (g) **Yields.**—Clone 1. ... Average 16.3 grams, per tapping.
- | | | | | |
|------------------------|---|------|---|---|
| Mixed Clones 1 & 9 ... | „ | 19.9 | „ | „ |
| Control trees ... | „ | 5.8 | „ | „ |

In Clone 1 the highest yielder gave 24.5 grams, and the poorest 9.1 grams per tapping.

In mixed Clones 1 & 9 the highest yielder gave 28.7 grams, and the poorest 12.3 grams per tapping.

In the Control Block the highest yielder gave 12.6 grams, and the poorest 2.3 grams per tapping.

Taking 80 trees per acre tapped on 160 days per annum
 Clone 1 would give 459 lbs. per acre per annum.
 Mixed Clones 1 & 9 would give 561 lbs. per acre per annum and the Control would give 163 lbs. per acre per annum.

These yields are from 5 year old rubber (4 years budded).

SUMATRA.

- (a) **Age.**—Of stock average 6 years. Of bud shoot average 5½ years.
- (b) **Girth.**—Average about 21 inches to 25 inches at 20 inches above union of scion and stock.
- (c) **Mother trees.**—Age not stated.
- (d) **Stocks.**—From selected seed.
- (e) **Control trees or Seedlings.**—From same selected seed as the stocks.
- (f) **Tapping System.**—Alternate monthly on daily cuts over half the circumference.

- (g) **Yields.**—Average yield from seedlings is 8 grams per tree per tapping which, on the basis of 160 tapping days and 80 trees per acre, gives 225 lbs. per acre per annum.

Clone 33.—Average 14.65 grams per tree per tapping equalling on above basis 413 lbs. per acre per annum.

Clone 36.—Average 11.16 grams per tree per tapping equalling on above basis 314 lbs. per acre per annum.

Clone 50.—Average 20.11 grams per trees per tapping equalling on above basis 567 lbs. per acre per annum.

Clone 52.—Average 12.98 grams per tree per tapping equalling on above basis 366 lbs. per acre per annum.

Clone 80.—Average 13.04 grams per tree per tapping equalling on above basis 367 lbs. per acre per annum.

JAVA.

- (a) **Age.**—Of stock 5 years, of bud shoot $4\frac{1}{2}$ years.
 (b) — — — —
 (c) **Mother trees.**—Average age 9 years at time buds were taken from them.
 (d) **Stocks.**—Selected seed from trees of good girth measurement.
 (e) **Control trees.**—Same seed as stocks on which buds were grafted.
 (f) **Tapping System.**—Single cut on half circumference.
 (g) **Yields.**—Expressed in terms of percentage of the average yield of the control trees.

Clone	A.	B.	C.	D.	E.	F.	Control.
Percentage	87	138	162	122	195	90	100

Clones A. and F. are, therefore, poorer yielders than the control, but B. C. D. and E. are higher.

Expressed in terms of yield per centimeter of tapping out:—

Clone	A.	B.	C.	D.	E.	F.	Control.
Percentage.	101	174	191	157	253	111	100

It is pointed out that the bud shoot is 6 months younger than the control shoot.

CONCLUSIONS.

From the above it is clear that in Ceylon general budding cannot yet be undertaken with certainty of success. It is not possible by external characters to recognize a high-yielder which will produce high yielding offspring. What has to be done on estates is first the selection of a number of high-yielders and the setting apart of some of these to provide bud-wood and of others to provide seed for the stocks. Nurseries from the seed of those reserved for stocks should be planted this year or the seed should be planted out at stake and those trees reserved for buds should be pollarded in order to provide good bud-wood from which to bud the stocks being grown. It has been found that the best results are secured when buds are taken from bud-wood which is the same age as the bark of the stock on to which it is to be bud-grafted. An accurate record of the buddings should be kept in order that definite data will be available as to those combinations which give the most satisfactory results. It is only when the behaviour of mother trees is known as tested by the tapping results that progress on sound lines can be made.

The latest report just received from Sumatra shows that the yields of seedlings and of a mixture of buddings from unproved clones are about the same. The experiment reported on shows that the method of using buddings from unproved mother trees on a large scale should not be applied when laying out a plantation with budded plants. Such experiments should only be laid down by estates on limited acreages in order to secure data on the estates own land regarding the value of different mother trees for future plantings and budding work. For such experiments at least one half acre of buddings should be planted from each selected tree and the likely mother trees which it is desirable to test should not be less than 20 if the estate contemplates planting out in future years anything in excess of 100 acres of budded rubber.

The Rubber Research Scheme has commenced the development of an experiment station of 50 acres in extent in the Kalutara District for investigation work in the budding and selection of Rubber, but estates should not await the results from these experiments. They should lay down experiments of their own and advice as to how these experiments should be designed to yield the information required can be secured from the Officers of the Department of Agriculture or of the Rubber Research Scheme.

THE BUDDING OF RUBBER ON A COMMERCIAL SCALE.

The object of budding is obvious to all and requires no explanation. It is essentially a short cut to the production of high-yielding trees, and does away with the lengthy and difficult processes of selection, crossing, and the raising of genetically pure strains.

The plants raised by this means have a root stock grown from seed, preferably from vigorously growing trees, and a superstructure which develops from a bud attached at about ground level. The trunk, that is the part which will eventually be tapped, is developed from the bud and it will be seen that an acre planted up with budgrafts from a common Mother Tree is really an acre carrying about 100 separate parts of one tree. If the Mother Tree has been carefully selected on account of its high yielding properties, it would be expected that the acre would carry 100 trees equal in value to the parent. The value of Budding depends on the truth of this assertion.

It has now been proved that, while many Mother Trees reproduce their high-yielding properties in their budded offspring, there are some which do not, and, unless a tree has been previously tested, there is no definite assurance that the offspring so raised will come up to expectation. Unfortunately the only method, known at present, of testing this ability to hand on high-yielding properties, is actually to tap and record the yields of the progeny. This testing alone therefore requires 6 years at the very least.

There are no trees in Ceylon which have been proved in this way, but work has been begun by the Department of Agriculture and will also be carried out by the Rubber Research Scheme on its newly opened Experiment Station. In this year's programme twelve consistent high yielders are being tested. It will be possible to include a further 20 or 30 trees next year. Of these latter about a dozen have already been selected, records of yield from all of which have been kept for at least 12 months.

SCHEDULE OF OPERATIONS.

RECORDING OF YIELDS OF BUD MOTHER TREES.

It is essential that any tree used as a Mother Tree should be a consistent high yielder and for this reason yield records must be kept over a fairly long period. The longer this period of record keeping the better, as trees are known which, while yielding heavily one year, may fall off considerably the following year, or may even yield well for a month or two and then deteriorate to medium or even poor yielders.

One year should be the minimum period employed and if possible daily records should be kept. If this latter is not practicable the yield from one tapping may be recorded every fortnight, but this of course gives no exact measure of the actual total yield obtained.

PRUNING BACK OF THE MOTHER TREES FOR THE PRODUCTION OF BUDWOOD.

Once the Mother Trees have been definitely selected some of the branches should be pruned back to encourage the growth of young succulent shoots, from which the bark strips readily.

It is better not to cut the branch through where it is very thick as the resulting wound will then take a long time to heal over, and it may offer lodgment for fungal spores. No branch of a greater diameter than 4 inches should be cut and not more than 3 of the adventitious shoots which appear should be allowed to grow. This will in most cases ensure a complete callusing over of the cut branch and a supply of well-grown budwood will be available. This pruning can be conveniently carried out about the time the nursery for the stocks is being laid out.

LAYING OUT OF NURSERY.

It is advisable to have the stocks about one year, or at least not more than two years old, at the time of Budding, and they should be well-grown. To ensure that vigorous stocks are available, the nursery should be in a high state of cultivation and the plants not too close together. It is suggested that rows be about 1 foot apart and the plants about 9 inches apart in the rows. This allows sufficient room to bud the plants in the nursery if this is desired, and prevents over-

crowding. If the nursery is laid down at the same time as the Mother Trees are lopped, the stock and the branch from which the bud is to be taken will be of about the same age.

In choosing seed for stocks it is advisable to use only that produced by vigorously growing trees which show fairly good yields. The total effects of stock on scion are not yet known but it may be that future yields will be affected detrimentally by the use of stocks grown from seed from a poorly grown unproductive type of tree.

BUDDING IN THE NURSERY AND BUDDING IN THE FIELD.

The actual budding operation can be carried out either before or after the stumps have been planted out. Both methods have been employed successfully, and the choice of methods depends on the time of year at which it is desired to bud, and probably on the growth of the stocks.

BUDDING IN THE NURSERY.—*Points in favour.*

The plants are close together and less time is required to carry out the work.

Transport of Budwood, tapes, etc., is reduced to a minimum.

Less time and labour are required in making the subsequent inspections of the plants and in rebudding any failures.

The plants afford each other a certain amount of protection.

The stocks are generally more vigorous, as it is easier to keep a nursery in a high state of cultivation, and much of the success of Budding depends on the vigour of the stocks.

A selection of stocks from the point of view of vigour is possible.

Points against.

Plants budded in the nursery are best planted out just as the buds are beginning to shoot and unless very carefully transported the buds are very liable to injury.

Unless the plants can be budded early in April it is unlikely that they will be ready to plant out during the S. W. Monsoon which is usually considered the most favourable time.

Whenever planted out there is an additional check on the growth after the bud has been fixed.

BUDDING IN THE FIELD.—*Points in favour.*

Here the stumps are planted out in their permanent situations before the bud is affixed and the unavoidable check to growth is past.

There is no shifting of the plants after budding with the attendant risks of loss through injury.

The stocks can be selected before being taken from the nursery, only the well-grown plants being used. (I do not advise budding on to stocks raised by the seed-at-stake method as no such selection is then possible.)

Points against.

The actual budding and the subsequent inspections are more difficult and laborious, and the rebudding of any failures will take a much longer time.

It is more difficult to have the whole plantation in such a high state of cultivation that the stocks will be as vigorous as those growing in a nursery.

HOW TO BUD.

PREPARATION OF BINDING TAPES.

The tapes used to bind up the point where the bud has been fixed must be prepared beforehand. Strips of thin cloth about 1 inch wide are soaked in a mixture of 2 parts of resin, 1 part bees wax and 1 part tallow. The resin is ground up fairly finely and melted along with the other ingredients in a kerosene tin over a fire. When thoroughly mixed the strips of cloth are soaked and then rolled on to sticks for ease in handling later.

BUDDING KNIFE.

The knife should have a strong sharp blade and also be supplied with the bone spatula which can be used for levering up the bark.

COLLECTION OF BUDWOOD.

The budwood is brought to the scene of operations as pieces of branches cut to suitable lengths. If a considerable distance has to be covered, the severed ends can be sealed with tallow, to prevent desiccation. These lengths can be packed in boxes with grass or other packing material to prevent damage.

PREPARATION OF STOCK FOR THE RECEPTION OF THE BUD.

A small rectangular piece of bark is removed from the stock at a height of not more than 2 inches from the ground. The size of the piece removed is regulated by the use of a small metal mould round which one clean cut is made down to the wood. The bark is then levered off with the spatula end of the knife, the greatest care being taken that nothing is allowed to touch the exposed cambium on the stock.

REMOVING THE BUD AND ATTACHING TO THE STOCK.

The bud is removed with a piece of bark attached, of such a size as to fit exactly into the place prepared on the stock. A mould is also used here, and this mould is slightly smaller than the other, and has a hole in the centre. The mould is laid on the budwood so that the bud can be seen through the hole and a sharp cut to the wood is made round three sides. The piece of bark containing the bud is then removed from the branch by a sharp cut from above downwards. This usually removes a piece of the wood which can easily be detached. Care is also taken here that nothing is allowed to touch the cambium of the bud before it is applied to the stock. The bud with the piece of bark is then fitted into the stock, care being taken to insert it the right way up. The whole is then bound up tightly with the prepared tape, beginning from the bottom.

If desired the piece of bark need not be completely removed from the stock; the cut need only be made round 3 sides of the mould leaving the piece unsevered at the base. The bud can be inserted behind this and the flap folded over it. A certain amount of protection against desiccation is thus afforded.

It is essential that the wrapping be airtight as any drying out will cause a failure.

SUBSEQUENT EXAMINATIONS.

In 14 days' time the bandage may be removed and the first inspection made. If the attached bud is still green the operation has been successful. If still green after a month, the stock is cut off about 2 inches above the point of union and the wood tarred.

POINTS TO BE GIVEN ESPECIAL CARE.

1. Make sure that the bud does not remain attached to the wood.
2. Avoid touching the cambium, either on the stock or on the piece of bark containing the bud.
3. It is most important that no adventitious buds on the stock be allowed to develop. This is a fairly common occurrence where the bud has failed to "take" and, unless closely examined, the shoot produced may very easily be mistaken for the budded shoot.

(Sgd.) R. A. TAYLOR,

Physiological Botanist.

RESEARCH LABORATORIES,
CULLODEN ESTATE,
NEBODA.

11th June, 1926.

NOTES ON SPRAYING OF RUBBER IN CEYLON.

It is considered that a few notes on the experience gained during the spraying operations carried out this year in Ceylon will prove helpful to those interested in this matter. These remarks are of the nature of addenda to the complete report published in the Rubber Research Scheme First Quarterly Circular for 1926.

Though not many Districts suffer from leaf-fall sufficiently severely to warrant a large expenditure on spraying it cannot too strongly be urged that estates should be prepared with knowledge of the organisation and technique of the spraying process in case the necessity for extensive operations should become imperative. The history of the disease in South India up to a few years ago was similar to that in Ceylon, so that foreknowledge of how to combat the same would doubtless save great loss.

One of the chief difficulties in Ceylon is that of labour. At least 10 coolies are necessary for each machine of the type at present in use, and one machine will usually spray only about 50 -60 acres in a season. Thus to spray 500 acres would require at least 100 coolies who would only be employed for the season suitable for spraying. To help to overcome this difficulty Messrs. Drake & Fletcher (the makers of the machine now in use) are manufacturing a sprayer driven by a small portable petrol engine. The engine will be detachable from the platform carrying the pump, and will be light and easily carried. It is hoped that a machine of this type will be available for test purposes in a month or two, and if a success, a supply may be available next year.

An insufficient amount of spraying has been done this year for any definite information to be obtained as to the efficacy of spraying in Ceylon, but it is hoped that next year those estates which have been supplied with outfits will carry out careful tests on those fields known to suffer most severely from leaf-fall and place on record the results obtained.

Maintenance.—A common fault in connection with the type of "D. S. P." sprayer now in use is the weakness of the handle. When this breaks it is best replaced by an old

alavango handle cut off, and screwed for the socket in the cross-piece.

Bursts in the hose caused by wear or too high a pressure are best repaired by the use of one of the "unions" provided for joining extra lengths of hose. Messrs. Drake & Fletcher are making an improved type of hose-repairer, but until this is available the "unions" are the most satisfactory.

Some outfits are sent out with light steel rods in place of the heavier bamboo "spray lances." It has been found that these rods bend somewhat easily, but they may be made more serviceable by lashing a strip of bamboo on to the back of the rod.

During spraying the nozzles should be adjusted to give as fine a spray as is possible compatible with reaching the topmost branches. The finer the spray the more economical the operation, and at the same time the more effective is the application.

(Signed) R. H. STOUGHTON-HARRIS,
Mycologist.

RESEARCH LABORATORIES,
CULLODEN ESTATE,
NEBODA,

29th June, 1926.

REPORT ON VISIT TO SOUTH INDIA.

A journey to North Travancore was made at the end of March, 1926, in order to investigate the methods employed there for the spraying of rubber trees. A full report on these methods has already been published (*see* First Quarterly Circular for 1926) and the present report is published for the purpose of drawing attention to other matters of rubber-planting interest noted during my stay. Arrangements were made to stay with Mr. Ashplant, Rubber Specialist to the United Planters' Association of South India, and I beg to record my appreciation of his hospitality and help.

I left Colombo at 4 p.m. on March 26th on the s.s. "Barjora," arriving at Tuticorin at 9 a.m. next morning. The water all round the coast of South India is very shallow and it is not possible for ships of large size to go close inshore. At Tuticorin it is necessary for sea-going ships to anchor two miles out, and the journey to land is made in a launch. A whole day had to be spent in Tuticorin as the train which connects with the mail train from Madura to Travancore State does not leave until 6.15 p.m. Tuticorin is a small, hot, and very dry town, with little of interest to see, except the large cotton mills of the Madura Cotton-Mills Company. It is the terminus of a branch line of the South Indian Railway running from Maniyachi Junction on the main line. A wait of an hour at the latter place allowed dinner to be taken at the Station Refreshment Room, and the night-mail left at 8.15 p.m. The South Indian trains are dirty and noisy and inferior in most respects to those in Ceylon. No sleeping-berths are provided, and it is necessary to take one's own mattress and pillow.

Quilon was reached at 5 a.m. on the 28th and breakfast obtained at the Traveller's Bungalow there. Only one railway-line exists in Travancore, and to reach the northern part of the State, which is the centre of the rubber-growing district, a journey of about one hundred miles must be made by car. I left Quilon at about 9 a.m. and travelled through to Mundakayam arriving at Mr. Ashplant's bungalow at about 2 p.m. The rest of this day was spent in discussing planting matters with Mr. Ashplant.

The following morning (29th) Mr. Ashplant took me by car to Manical Estate, some 5 miles distant, where spraying

was being carried on. The morning was spent in watching the spraying and discussing matters with the Assistant in charge. A few words on the comparison between rubber-planting in South India and in Ceylon would, perhaps, not be out of place here.

Such differences as exist in planting practice are due mainly to the fact that as yields are usually considerably lower in South India than in Ceylon, every effort to reduce the cost of production has to be made. Economy is effected in the first place by reducing "outside works." Clean weeding is no longer practised on many estates, and on those where a cover-crop has not yet been established the smaller weeds are usually allowed to grow unchecked. Very little terracing is carried out, roads are reduced to a minimum, and drains are fewer than is usual in Ceylon. Manuring is hardly ever carried out. Direct costs are lower because labour is plentiful and cheaper than in Ceylon, the average pay appearing to be about 7 annas, or about 44 cents per day. Tapping costs are reduced by giving larger tapping-tasks, up to 500 or even 600 trees constituting a "tapper's task." Expenditure on disease work, with the exception of spraying, is lower than in Ceylon, since practically no root-diseases occur, *Ustilina* being infrequent and *Fomes lignosus* almost unknown. In fact, the *Phytophthora* diseases, with Pink disease in young clearings are almost the only serious diseases on South Indian Estates.

The causes bringing about these lower yields are somewhat difficult to determine. The soil conditions appear to be much better than in Ceylon, and there seems no reason to suppose that fertility is less. Probably the two main causes are the monsoon conditions and the loss due to secondary leaf-fall. Mr. Ashplant estimates that the continuous rains of the S. W. Monsoon (which prevent tapping for long periods) result in a diminution of crop by at least 50 lbs. per acre. The loss due to secondary leaf-fall is impossible to estimate but is certainly not less than 10 lbs. per acre. It is possible that the large tapping tasks, resulting in less careful tapping, may be responsible for some loss in crop. Ceylon planters will probably hold that the low crops are partly due to the lack of manure, but there is no definite evidence to support this view. The bark appears to be thinner than on most Ceylon estates and of inferior texture which may have some effect on yields.

The afternoon of March 29th was spent in Mr. Ashplant's Laboratory. This consists of one large building near the bungalow and is very well equipped. He is at present engaged on an investigation into the relationship between physical measurements of latex-vessels and yields and has accumulated a large mass of data on the length, diameter and volume of the latex-vessels of trees of known yield. He has also designed a brass hydrometer for latex which is widely used throughout South India. It appears to be a great improvement on the ordinary brass metrolac, being of much stouter construction and with a somewhat longer scale. Records of the individual yields from trees of a young clearing which has recently come into bearing have been taken and in this connection he has made a complete set of drawings of each latex-vessel row in each tree for every year since planting.

The morning of March 30th was also spent in the Laboratory, and in the afternoon a visit was paid to Mundakayam Estate, the Superintendent of which (Mr. G. Macpherson) gave every possible facility for seeing the spraying being carried out on that estate.

The morning of the following day was spent in the field watching the spraying, and in the afternoon the work being carried out on Brown Bast control and on budding of Rubber was inspected. Mr. Ashplant is recommending the "isolation method" of treatment and it is being widely taken up in South India. The method, which is that of isolating the diseased area by a cut or channel down to the wood, is now familiar to most planters but a few words on the system of treatment employed in South India might be of interest. All trees noted by the tappers or by the Brown Bast gang (in this case 3 trained men) as being dry at some point on the cut or showing other signs of Brown Bast are marked and a sample of the bark is sent to the Superintendent who makes a microscopical examination to determine whether it is affected by Brown Bast. All trees proved in this way to be suffering from the disease are then marked for treatment. The Brown Bast gang delimits the affected area by means of a "Serdang" tapping knife, and then cuts the isolation-channel. The isolated surface is then scraped with a scraper made from a piece of hoop iron sharpened on both edges and bent into a curve. On this estate the whole of the diseased tissue is scraped away. Keuchenius who introduced the isolation

method of treatment does not advocate scraping, and states that the isolation alone is sufficient. It seems probable, however, that scraping will assist recovery. Several treated trees were examined and in each case it appeared that the disease had been checked and eventually cured.

An examination was made of a six-year-old clearing in which budded stumps were interplanted in November, 1925. The benefit of this method of planting is that, if the budded plants are a success, the older rubber could be removed and if not it could remain untouched. The five-month old shoots were mostly well grown, some being already six feet high. This was the only budded rubber actually seen, except a certain amount of experimental budding in some of the nurseries near the Laboratory, but many estates are taking an interest in the matter and a good deal of budding has been carried out.

On the following day (April 1st) Yendayar Estate, the property of Mr. J. J. Murphy, was visited. Here the Drake & Fletcher power spraying-outfit were in use. The disadvantages of this machine have been dealt with in the report on spraying. In the afternoon an inspection was made of his tea and rubber factories. Rubber manufacture in South India does not appear to differ in any essential from that followed in Ceylon, and the quality of the rubber appeared to be identical. On Mundakayam Estate (where smoked sheet only is made) an improved type of smoke-house, with enclosed fire chamber, and a secondary trap-chamber was under construction. The advantages claimed are that no dirt or dust could possibly reach the rubber from the fire.

On Thursday, April 2nd, I left Mundakayam at 10 a.m. arriving at Quilon at 6 p.m. The return journey was similar to the outward, and Colombo was reached at mid-day on April 4th.

(Signed) R. H. STOUGHTON-HARRIS,
Mycologist.

RESEARCH LABORATORIES,
CULLODEN ESTATE,
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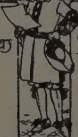
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